UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,365	03/01/2004	Joseph Coffey	2316.1832US01	8935

7590 12/23/2008

Merchant & Gould P.C.
P.O. Box 2903
Minneapolis, MN 55402-0903

EXAMINER	
LIU, LI	

ART UNIT	PAPER NUMBER
2613	

MAIL DATE	DELIVERY MODE
12/23/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/791,365	COFFEY, JOSEPH	
	Examiner	Art Unit	
	LI LIU	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 September 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 June 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on 9/11/2008 have been fully considered but they are not persuasive and are moot in view of the new ground(s) of rejection.

1). Applicant's argument – "Choy requires use of the same types of IOC card at opposite sides of an optical channel". "Choy requires consistent formatting on both sides of the optical channel and fails to disclose any conversion therebetween, it is entirely inconsistent with an arrangement that uses conversion to a common or main signal format, which is used in the present application to allow flexible conversion at each side of an optical distribution channel. Therefore, the Choy reference teaches away from reformatting data to comply with a main signal or common signal protocol".

Examiner's response – First, the applicant also needs "formatting on both sides of the optical channel". As disclosed by the applicant, the electrical to electrical conversion circuitry needs to be <u>selected</u> for the native protocol media signals which are anticipated for WDM (page 5, line 5-8); and the E/E converter card must be appropriately selected to accommodate different native protocol media signal format (page 10, line 12-13). That is, a <u>single</u> E/E card is not compatible for all different input native protocols. And different card is used for different native protocol media signals.

By "formatting", reference Choy provides the ability to select a particular IOC (E/E card) for different serial or parallel etc communication protocols and formats; and then these raw protocol/format data are converted to ECL signals in the IOC card. Therefore, Choy does not teach away from claimed invention.

Second, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The second reference Lebby et al teaches an electrical to electrical converter (27 in Figure 1) to format the incoming raw data into any selected or predetermined format (one of NRZ, RZ, TRISTATE, DELTAMOD MANCHESTER etc formats). That is, the combination of Choy and Lebby teaches or suggests conversion from native format to a common signal format.

Therefore, Choy and Lebby et al do not teaches away from reformatting data to comply with a main signal or common signal protocol.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-6, 14, 15 and 16-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

1). Claim 1, and thus depending claims 2-6, recite the limitation "a plurality of separate electrical to electrical converters, each directly and removably mated with one of the optical to electrical converters at a card edge connector to receive a power signal" in line 10-12. According to the original disclosure, the electrical link (104 in Figures 3 and 4), connecting between E/E converter card and the O/E converter card, is used for conveying any power needed by the E/E converter card (page 6, line 11-13). The original disclosure does not disclose that the E/E converter card receives a power signal via the card edge connector. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

2). Claim 14, and thus depending claim 15, recite the limitation "each main signal to electrical converter card removably and directly mated with one of the optical to electrical converter card at a card edge connector to receive a power signal" in line 11-13. According to the original disclosure, the electrical link (104 in Figures 3 and 4), connecting between E/E converter card and the O/E converter card, is used for conveying any power needed by the E/E converter card (page 6, line 11-13). The original disclosure does not disclose that the E/E converter card receives a power signal via the card edge connector. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

3). Claim 16, and thus depending claims 17-19, recite the limitation "removably and directly mating an electrical converter card to a selected one of the optical to electrical converter card at a card edge connector to receive a power signal" in line 8-10. According to the original disclosure, the electrical link (104 in Figures 3 and 4), connecting between E/E converter card and the O/E converter card, is used for conveying any power needed by the E/E converter card (page 6, line 11-13). The original disclosure does not disclose that the E/E converter card receives a power signal via the card edge connector. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 16-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 16, and thus depending claims 17-19, recites the limitation "via the main signal" in line 10. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1, 3-14 and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Choy et al (US 5,487,120) in view of Lebby et al (US 5,218,465) and Steinman (US 6,625,033) and Carbone et al (US 2003/0039006).

1). With regard to claim 1, Choy et al discloses a WDM optical system comprising:

first and second WDM's (12a and 12b in Figure 1 and Figure 6);

an optical link (28 in Figure 1 and 6) for transmit and receive signals for each WDM; each WDM including circuitry including a multiplexer (24a in Figure 1 and 25a in Figure 6) and a demultiplexer (24b in Figure 1 and 24a in Figure 6);

each WDM including a plurality of separate optical to electrical converters (LRC 20 in Figure 1 and 6) connecting to a backplane (the O/E converters LRC is connected to the backplane via connectors 53/54, column 6 line 63 to column 7 line 13), each optical to electrical converter removably mated with the circuitry (the LRC is a pluggable module, column 6 line 62-64, and connected to the multiplexer/demultiplexer via backplane connector 53 and 54) and configured to transmit and receive specific format signals (column 5, line 14-30, and column 6 line 3-30, the signal format is based on the signal from the electrical to electrical converters IOC) and operate at a separate wavelength (each LRC transmits optical signal of different wavelength, column 5, line 47-60);

each WDM including a plurality of separate electrical to electrical converters (14 in Figure 1 and 6; the IOC card performs the electrical to electrical conversion using the I/O Specific Media Connector, Tx 32 and Rx 34 as well as the ECL buffers 38 and 40; e.g., the Rx 34 receives a native signal format, and the Rx 34 and the ECL 40 convert the native format to another electrical format and then the ECL output the ECL signal; the laser in LRC is operated based on the ECL signals, column 6, line 7-11), each mated with one of the optical to electrical converters via a backplane (42 and 44 in Figure 2, connected to LRC via BACKPLANE) to receive a power (the power is supplied via backplane, column 7, line 17-20) and to send and receive specific format signals (the IOC card send and receive electrical signals to/from LRC), each electrical to electrical converter including input and output signal locations (16a in Figure 1 and 6, column 4, line 14-17).

But, Choy et al does not expressly disclose that the optical to electrical converter transmits and receive common format signals, the common format signals having the same format for each of the plurality of separate optical to electrical converters, and the electrical to electrical converter provides conversion between native protocol media signals and the common format signals; and each electrical to electrical converters directly and removably mated with one of the optical to electrical converters at a card edge connector.

However, Lebby et al, in the same field of endeavor, teaches an electrical to electrical converter (27 in Figure 1) to format the incoming raw data into any selected or predetermined format, including but not limited to NRZ, RZ, TRISTATE, DELTAMOD

MANCHESTER, etc. (column 3, line 23-27. Note: in Figure 1, a cross connect apparatus 35 is between the formatting circuitry 27 and the transducer (E/O 22); but, Lebby et al also discloses “it will be understood by those skilled in the art that the switching might actually be accomplished in the optical circuitry after the electrical data signals have been converted to optical data signals by transducers 22”. That is the E/E formatting circuitry can be directly coupled to the transducer (E/O 22 and O/E 24), and the switching 35 is placed after the E/O circuitry). That is, Lebby teaches an electrical to electrical converter that converts a native signal or raw data to a common format signal (one of the NRZ, RZ or TRUSTATE etc modulation format).

But, Lebby does not expressly disclose the common format signals having the same format for each of the plurality of separate optical to electrical converters.

However, Carbone et al, teaches a WDM system in which a common format signals (the RZ data signals) having the same format (the return-to-zero modulation format) for each of the plurality of separate optical to electrical converters (in the transmission station 2, Figure1, there are a plurality of O/E converters: the laser source or directly modulated laser, [0092]. The plurality of laser sources are modulated by the common RZ format data signals either directly or using external modulator, and the lasers output the RZ pulses, [0128] line 20-21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the formatting circuitry and a predetermined common format as taught by Lebby et al and Carbone et al to the system of Choy et al so that the system is more flexible, and different raw protocol signals can be accepted

by the WDM system and transmitted over an optical cable, and system upgrade is made easier.

But, Choy et al and Lebby et al and Carbone et al do not disclose that each electrical to electrical converters directly and removably mated with one of the optical to electrical converters at a card edge connector.

However, Steinman, teaches a system and method to directly and removably connect two circuit cards via a card edge connector. As shown in Figure 8, the first circuit card (motherboard 802) is removably coupled to the backplane via the backplane connector 812, the second circuit card (the daughter board 804) is directly and removably mated with the first circuit card 802 at a card edge connector 816/818.

As disclosed by Steinman, because of the space limitations for the rack mounted components, it is desirable to minimize the overall size of the system, and space availability considerations may often drive equipment purchase decisions (column 3 line 8-10). By connecting one card to another card in the co-planer fashion, the system can be made more compact, and the limited number of slots on the backplane can be more efficiently used.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the two card connection and card edge connector as taught by Steinman to the system of Choy et al and Lebby et al and Carbone et al so that the electrical to electrical converters and optical to electrical converters can be removably connected in a co-planer fashion, and the system can be made more

compact, and the backplane with limited number of slots can accepts more O/E cards with E/E attached, and the diagnosis of devices can also be made more convenient.

2). With regard to claim 3, Choy et al and Lebby et al and Carbone et al and Steinman disclose all of the subject matter as applied to claim 1 above. And Choy et al further disclose wherein the circuitry includes a backplane (Figure 4) including two optical ports (two port of the BACKPLANE are used to connect to 53 and 54 in Figure 3A) for removably connecting to the separate optical to electrical converters.

3). With regard to claims 4-6, Choy et al and Lebby et al and Carbone et al and Steinman disclose all of the subject matter as applied to claim 1 above. And Choy et al disclose wherein the electrical to electrical converter accept coaxial signals, twisted pair signals or optical signals (column 4 line 14-17, and line 43-59, the I/O specific media 16 can be fiber or copper, optical or non-optical data stream). And the combination of Choy et al and Lebby et al and Carbone et al and Steinman disclose teaches that the electrical to electrical converter converts the coaxial signals, twisted pair signals or optical signals into a common format electrical signal (e.g., the RZ modulation format signal).

4). With regard to claim 7, Choy et al discloses a WDM chassis comprising:

a backplane (Figure 4) including an input power port (the port for power supplying, column 7 line 20), a control signal port (e.g., the diagnostic processor card 26 is plugged in one port of the backplane for controlling purpose, Figure 4), and a plurality of optical interface ports (e.g., the ports coupled with the connectors 52-54 and 64, Figure 3A) for interfacing with an optical to electrical conversion card, each optical

interface port including a power port, a control signal port, and at least one optical port (column 7 line 13-22);

a plurality of optical to electrical cards (20 in Figure 3A and 4) each including a backplane interface portion (e.g., 52-54 and 64 in Figure 3A connected via BACKPLANE) for mating with the optical interface port and including a power port (column 7 line 20), a control signal port (Figure 3A, Laser Control Status, Received Data Status, column 7 line 20-21), and at least one optical port (53 and 54 in Figure 3A, and I/O Fibers in Figure 4, column 6 line 40-44), each optical to electrical card (20 in Figures 3A and 4) including optical to electrical conversion circuitry (DFB laser in Figure 3A) for converting between specific format signals and optical signals (Figure 3A, the optical, the laser in LRC is operated based on the ECL signals and outputs modulated signals, column 6, line 7-11), each optical to electrical card including an electrical interface port (e.g., 52 and 64 etc in Figure 3A) including a power port (column 7 line 21), a control signal port, and at least one electrical port (Figure 3A, column 7 line 19-22);

a plurality of electrical to electrical cards (14 in Figure 2 and 4, column 6 line 62-column 7 line 12) each including a rear interface portion (e.g., 42 and 44 in Figure 2) for mating with the electrical interface port (the E/E cards are mated with the O/E cards via the backplane connectors) and including a power port (column 7 line 3-8), a control signal port (e.g., PORT STATUS OUPUT in Figure 2), and at least one electrical port (e.g., 16a and 16b in Figure 1, or 30 in Figure 2, or 42 and 44 in Figure 2), each electrical to electrical card including electrical to electrical conversion circuitry for converting between native protocol media signals and specific format signals (30, 32,

34, 38 and 40 in Figure 2, column 4 line 14-17, and line 43-59, and column 5 line 35-39; the IOC card performs the electrical to electrical conversion using the I/O Specific Media Connector, Tx 32 and Rx 34 as well as the ECL buffers 38 and 40; e.g., the Rx 34 receives a native signal format, and the Rx 34 and the ECL 40 convert the native format to another electrical format and then the ECL output the ECL signal. And the IOC card is a General Purpose interface, it provides an open capability to support different signal format, column 5 line 1-30), each electrical to electrical card including a media interface port including at least one main signal port (e.g., I/O media connector 30 in Figure 2, column 7 line 13-19).

But, Choy et al does not expressly disclose that the optical to electrical converter card converts between common format signals and optical signals, the common format signals having the same format for each of the plurality of separate optical to electrical converter card, and the electrical to electrical converter card provides conversion between native protocol media signals and the common format signals; and each electrical to electrical converter card includes a card edge connector for removably and directly mating with an electrical port of the optical to electrical converter card.

However, Lebby et al, in the same field of endeavor, teaches an electrical to electrical converter (27 in Figure 1) to format the incoming raw data into any selected or predetermined format, including but not limited to NRZ, RZ, TRISTATE, DELTAMOD MANCHESTER, etc. (column 3, line 23-27. Note: in Figure 1, a cross connect apparatus 35 is between the formatting circuitry 27 and the transducer (E/O 22); but, Lebby et al also discloses “it will be understood by those skilled in the art that the

switching might actually be accomplished in the optical circuitry after the electrical data signals have been converted to optical data signals by transducers 22”. That is the E/E formatting circuitry can be directly coupled to the transducer (E/O 22 and O/E 24), and the switching 35 is placed after the E/O circuitry). That is, Lebby teaches an electrical to electrical converter that converts a native signal or raw data to a common format signal (one of the NRZ, RZ or TRUSTATE etc modulation format).

But, Lebby does not expressly disclose the common format signals having the same format for each of the plurality of separate optical to electrical converter cards.

However, Carbone et al, teaches a WDM system in which a common format signals (the RZ data signals) having the same format (the return-to-zero modulation format) for each of the plurality of separate optical to electrical converters (in the transmission station 2, Figure1, there are a plurality of O/E converters: the laser source or directly modulated laser, [0092]. The plurality of laser sources are modulated by the common RZ format data signals either directly or using external modulator, and the lasers output the RZ pulses, [0128] line 20-21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the formatting circuitry and a predetermined common format as taught by Lebby et al and Carbone et al to the system of Choy et al so that the system is more flexible, and different raw protocol signals can be accepted by the WDM system and transmitted over an optical cable, and system upgrade is made easier.

But, Choy et al and Lebby et al and Carbone et al do not disclose that each electrical to electrical converters directly and removably mated with one of the optical to electrical converters at a card edge connector.

However, Steinman, teaches a system and method to directly and removably connect two circuit cards via a card edge connector. As shown in Figure 8, the first circuit card (motherboard 802) is removably coupled to the backplane via the backplane connector 812, the second circuit card (the daughter board 804) is directly and removably mated with the electrical interface of first circuit card 802 at a card edge connector 816/818.

As disclosed by Steinman, because of the space limitations for the rack mounted components, it is desirable to minimize the overall size of the system, and space availability considerations may often drive equipment purchase decisions (column 3 line 8-10). By connecting one card to another card in the co-planer fashion, the system can be made more compact, and the limited number of slots on the backplane can be more efficiently used.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the two card connection and card edge connector as taught by Steinman to the system of Choy et al and Lebby et al and Carbone et al so that the electrical to electrical converters and optical to electrical converters can be removably connected in a co-planer fashion, and the system can be made more compact, and the backplane with limited number of slots can accepts more O/E cards with E/E attached, and the diagnosis of devices can also be made more convenient.

5). With regard to claims 8-10, Choy et al and Lebby et al and Carbone et al and Steinman disclose all of the subject matter as applied to claim 7 above. And Choy et al further discloses wherein the at least one main signal port is a coaxial port, a twisted pair port or an optical port (30 in Figure 2, column 4 line 14-17, line 43-59, Choy et al teaches that the I/O specific media 16 can be fiber or copper, optical or non-optical data stream, e.g., fiber digital data interface FDDI which needs fiber port, and the T1 and CDDI needs twisted pair port, HIPPI or TTL needs coaxial cable port).

6). With regard to claim 11, Choy et al and Lebby et al and Carbone et al and Steinman disclose all of the subject matter as applied to claim 7 above. And Choy et al further discloses wherein the backplane defines a first plane (Figure 4, the plane which the IOC and LRC need to plug in), and the optical to electrical cards each define a second plane (the plane defined by 20 in Figure 4) transverse to the first plane (the LRCs are plugged into a slot in the lower row, column 6 line 31 to column 7 line 12).

7). With regard to claim 12, Choy et al and Lebby et al and Carbone et al and Steinman disclose all of the subject matter as applied to claims 7 and 11 above. And Choy et al further discloses wherein the electrical to electrical cards (14 in Figure 4) each define a third plane parallel to the second plane (IOC and LRC are parallel in Figure 4).

8). With regard to claim 13, Choy et al and Lebby et al and Carbone et al and Steinman disclose all of the subject matter as applied to claims 7, 11 and 12 above. And Choy et al further discloses the WDM chassis further comprising a chassis housing (66 in Figure 4) wherein the backplane defines a rear of the chassis housing (Figure 4, the

backplane is at the rear of the chassis, and the E/E and O/R card are in front), wherein the optical to electrical cards and the electrical to electrical cards are received in a front opening of the chassis housing (Figure 4, the IOC and LRC are displaced in front, column 6 line 36-50).

9). With regard to claim 14, Choy et al discloses a WDM optical system comprising:

a first WDM (12a in Figure 1 and 6) including a chassis (Figure 4) and circuitry including a multiplexer (24a in Figure 1 or 25a in Figure 6);

a second WDM (12b in Figure 1 and 6) including a chassis (Figure 4) and circuitry including a demultiplexer (24b in Figure 1 or 25b in Figure 6);

an optical link (28 in Figure 1 and 6) for transmitting multiplexed optical signals from the first WDM for receipt by the second WDM;

each WDM including a plurality of separate optical to electrical converter cards (20 in Figure 1 and 6) received by each chassis, each optical to electrical converter card connecting to a backplane in the chassis (the O/E converters LRC is connected to the backplane via specific slot or connectors, column 6 line 63 to column 7 line 1-3) and operateing at a separate wavelength (Figure 3a, each LRC transmits optical signal of different wavelength, column 5, line 47-65) to transmit and receive a main signal (the signal to/from the E/E converter card, and column 6 line 3-30), each optical to electrical card removably mated with the circuitry via the backplane (the LRC is a pluggable module, column 6 line 62-64; the LRC is connected to the backplane and to the

multiplexer/demultiplexer via connector 53 and 54, column 6 line 63 to column 7 line 13);

each WDM including a plurality of separate main signal to electrical converter cards (14 in Figure 1 and 6) received by each chassis, each main signal to electrical converter card mated with one of the optical to electrical converter cards via backplane (42 and 44 in Figure 2) to receive a power (the power is supplied via backplane, column 7 line 19-22) and to communicate via the main signal, each main signal to electrical converter card including a main signal port (30 in Figure 2) and configure to convert between the main signal and a native protocol media signal (the IOC card performs the electrical to electrical conversion using the I/O Specific Media Connector, Tx 32 and Rx 34 as well as the ECL buffers 38 and 40; e.g., the Rx 34 receives a native signal format, and the Rx 34 and the ECL 40 convert the native format to another electrical format and then the ECL output the ECL signal).

But, Choy et al does not expressly disclose that the main signals having the same format for each of the plurality of separate optical to electrical converters; and each main signal to electrical converter card removably and directly mated with one of the optical to electrical converter cards at a card edge connector.

However, Lebby et al, in the same field of endeavor, teaches an electrical to electrical converter (27 in Figure 1) to format the incoming raw data into any selected or predetermined format, including but not limited to NRZ, RZ, TRISTATE, DELTAMOD MANCHESTER, etc. (column 3, line 23-27. Note: in Figure 1, a cross connect apparatus 35 is between the formatting circuitry 27 and the transducer (E/O 22); but,

Lebby et al also discloses “it will be understood by those skilled in the art that the switching might actually be accomplished in the optical circuitry after the electrical data signals have been converted to optical data signals by transducers 22”. That is the E/E formatting circuitry can be directly coupled to the transducer (E/O 22 and O/E 24), and the switching 35 is placed after the E/O circuitry). That is, Lebby teaches an electrical to electrical converter that converts a native signal or raw data to a common format signal (one of the NRZ, RZ or TRUSTATE etc modulation format).

But, Lebby does not expressly disclose a plurality of separate optical to electrical converters having the main signals with the same format.

However, Carbone et al, teaches a WDM system in which a common format signals (the RZ data signals) have the same format (the return-to-zero modulation format) for each of the plurality of separate optical to electrical converters (in the transmission station 2, Figure1, there are a plurality of O/E converters: the laser source or directly modulated laser, [0092]. The plurality of laser sources are modulated by the common RZ format data signals either directly or using external modulator, and the lasers output the RZ pulses, [0128] line 20-21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the formatting circuitry and a predetermined common format as taught by Lebby et al and Carbone et al to the system of Choy et al so that the system is more flexible, and different raw protocol signals can be accepted by the WDM system and transmitted over an optical cable, and system upgrade is made easier.

But, Choy et al and Lebby et al and Carbone et al do not disclose that each main signal to electrical converter card removably and directly mated with one of the optical to electrical converter cards at a card edge connector.

However, Steinman, teaches a system and method to directly and removably connect two circuit cards via a card edge connector. As shown in Figure 8, the first circuit card (motherboard 802) is removably coupled to the backplane via the backplane connector 812, and the second circuit card (the daughter board 804) is directly and removably mated with the first circuit card 802 at a card edge connector 816/818.

As disclosed by Steinman, because of the space limitations for the rack mounted components, it is desirable to minimize the overall size of the system, and space availability considerations may often drive equipment purchase decisions (column 3 line 8-10). By connecting one card to another card in the co-planer fashion, the system can be made more compact, and the limited number of slots on the backplane can be more efficiently used.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the two card connection and card edge connector as taught by Steinman to the system of Choy et al and Lebby et al and Carbone et al so that the electrical to electrical converters and optical to electrical converters can be removably connected in a co-planer fashion, and the system can be made more compact, and the backplane with limited number of slots can accepts more O/E cards with E/E attached, and the diagnosis of devices can also be made more convenient.

10). With regard to claim 16, Choy et al discloses a method of optical system management comprising:

providing multiplexing and demultiplexing circuitry (24 in Figure 1 and 24 and 25 in Figure 6) for a multi-channel signal system;

mating a plurality of optical to electrical converter cards (22 in Figure 1 and 6, 53 and 54 in Figure 3A) to the circuitry via a backplane (the O/E converters LRC is connected to the backplane via connectors 53 and 54, column 6 line 63 to column 7 line 13), each optical to electrical converter card selected to transmit and receive optical signals at a distinct wavelength of light relative to the other optical to electrical converter cards of the multi-channel system (Figure 3a, column 5 line 47-65);

mating an electrical to electrical converter card to a selected one of the optical to electrical converter cards (18 in Figure 1 and 6, 42 and 44 in Figure 2) via the backplane (42 and 44 in Figure 2, connected to LRC via BACKPLANE) to receive a power (the power is supplied via backplane, column 7 line 19-22) and to communicate via the main signal (the signals to/from the O/E converter card) with the selected one of the optical to electrical cards (Figure 1, each IOC card is connected with only one LRC card), wherein the electrical to electrical converter card transmits and receives native protocol media signals in a first format, and converts the signals to a second format signal (Figure 2, column 4 line 14-17, and line 43-59, and column 5 line 1-13 and line 35-39; the IOC card performs the electrical to electrical conversion using the I/O Specific Media Connector, Tx 32 and Rx 34 as well as the ECL buffers 38 and 40; e.g., the Rx 34 receives a native signal format, and the Rx 34 and the ECL 40 convert the

native format to another electrical format and then the ECL output the ECL signal. Through the IOC card, the system is protocol-independent WDM system), wherein the signals of the second electrical format are converted to optical signals at the distinct wavelength of light of the selected optical to electrical converter card (Figure 3a, column 5 line 47-65).

But, Choy et al does not expressly disclose that the electrical to electrical converter card converts the signals to a second common format signal, the common format signals having the same format for each of the plurality of separate optical to electrical converter card; and the electrical to electrical converter card removably and directly mated to one of the optical to electrical converter card at a card edge connector.

However, Lebby et al, in the same field of endeavor, teaches an electrical to electrical converter (27 in Figure 1) to format the incoming raw data into any selected or predetermined format, including but not limited to NRZ, RZ, TRISTATE, DELTAMOD MANCHESTER, etc. (column 3, line 23-27. Note: in Figure 1, a cross connect apparatus 35 is between the formatting circuitry 27 and the transducer (E/O 22); but, Lebby et al also discloses “it will be understood by those skilled in the art that the switching might actually be accomplished in the optical circuitry after the electrical data signals have been converted to optical data signals by transducers 22”. That is the E/E formatting circuitry can be directly coupled to the transducer (E/O 22 and O/E 24), and the switching 35 is placed after the E/O circuitry). That is, Lebby teaches an electrical to electrical converter that converts a native signal or raw data to a common format signal (one of the NRZ, RZ or TRUSTATE etc modulation format).

But, Lebby does not expressly disclose the common format signals having the same format for each of the plurality of separate optical to electrical converter card.

However, Carbone et al, teaches a WDM system in which a common format signals (the RZ data signals) having the same format (the return-to-zero modulation format) for each of the plurality of separate optical to electrical converters (in the transmission station 2, Figure1, there are a plurality of O/E converters: the laser source or directly modulated laser, [0092]. The plurality of laser sources are modulated by the common RZ format data signals either directly or using external modulator, and the lasers output the RZ pulses, [0128] line 20-21).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the formatting circuitry and a predetermined common format as taught by Lebby et al and Carbone et al to the system of Choy et al so that the system is more flexible, and different raw protocol signals can be accepted by the WDM system and transmitted over an optical cable, and system upgrade is made easier.

But, Choy et al and Lebby et al and Carbone et al do not disclose that the electrical to electrical converter card is removably and directly mated to one of the optical to electrical converters at a card edge connector.

However, Steinman, teaches a system and method to directly and removably connect two circuit cards via a card edge connector. As shown in Figure 8, the first circuit card (motherboard 802) is removably coupled to the backplane via the backplane

connector 812, the second circuit card (the daughter board 804) is directly and removably mated with the first circuit card 802 at a card edge connector 816/818.

As disclosed by Steinman, because of the space limitations for the rack mounted components, it is desirable to minimize the overall size of the system, and space availability considerations may often drive equipment purchase decisions (column 3 line 8-10). By connecting one card to another card in the co-planer fashion, the system can be made more compact, and the limited number of slots on the backplane can be more efficiently used.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the two card connection and card edge connector as taught by Steinman to the system of Choy et al and Lebby et al and Carbone et al so that the electrical to electrical converters and optical to electrical converters can be removably connected in a co-planer fashion, and the system can be made more compact, and the backplane with limited number of slots can accepts more O/E cards with E/E attached, and the diagnosis of devices can also be made more convenient.

11). With regard to claim 17-19, Choy et al and Lebby et al and Carbone et al and Steinman disclose all of the subject matter as applied to claim 16 above. And Choy et al further disclose wherein the electrical to electrical converter card transmits and receives a coaxial native protocol media signal, a twisted pair native protocol media signal or an optical native protocol media signal (30 in Figure 2, column 4 line 14-17, line 43-59, Choy et al teaches that the I/O specific media 16 can be fiber or copper, optical or non-optical data stream, e.g., fiber digital data interface FDDI which needs

fiber port, and the T1 and CDDI needs twisted pair port, HIPPI or TTL needs coaxial cable port).

8. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable Choy et al and Lebby et al and Carbone et al and Steinman as applied to claim 1 above, and in further view of Oberg et al (US 2005/0084262).

Choy et al and Lebby et al and Carbone et al and Steinman disclose all of the subject matter as applied to claim 1 above. Choy et al teaches two fiber links 28, one a primary link and the other a backup, and a bidirectional optical switch is used to select either the primary or the backup fiber (column 9, line 53-62). And Lebby et al also teaches that in some embodiments, the optical path in optical channel 12 has a redundant path which is automatically switched in when a failure in the original optical path is detected (column 4 line 23-36).

But Choy et al does not expressly disclose the WDM optical system further comprising splitter circuitry, wherein the optical link includes dual optical links, wherein two transmit and two receive signal pathways are provided.

However, the redundant 1+1 protection has been widely used in the optical communications for providing extremely rapid recovery from network/path failure. Oberg et al discloses one of such protection schemes (Figure 3a), Oberg et al teaches the splitter circuitry (17 in Figure 3a), wherein the optical link includes dual optical links (Figure 3a, the right half circle path and the left half circle path), wherein two transmit (the two transmit signal pathways: one from 19w to 21e clockwise, another from 19e to

21w counterclockwise) and two receive signal pathways (the two receive signal pathways: one counterclockwise shown as 1", another path is clockwise) are provided.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the splitter to create two optical paths so that a fast restoration or recovery of signals can be obtained when fault occurs and the system reliability is increased.

9. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable Choy et al and Lebby et al and Carbone et al and Steinman as applied to claim 14 above, and in further view of de Lind van Wijngaarden (US 6,241,778)

Choy et al and Lebby et al and Carbone et al and Steinman disclose all of the subject matter as applied to claim 14 above. And the combination of Choy et al and Lebby et al and Carbone et al and Steinman further discloses wherein the main signal to electrical converter cards convert between one of coaxial, twisted pair, and optical signals (Choy: column 4 line 14-17, and line 43-59) and a common format signals, wherein the optical to electrical converter cards convert between the common format electric signals and optical signals at one of a selected wavelength for respective multiplexing and demultiplexing by the respective multiplexer and demultiplexer of the first and second WDM's (Figure 1, column 5 line 47 to column 6 line 30).

But, Choy et al does not expressly state that the common format signal is the NRZI format signal.

However, The NRZI has been widely used in the communications since it is especially helpful in situations where bit stuffing is employed -- the practice of adding

bits to a data stream so it conforms with communications protocols. de Lind van Wijngaarden teaches to use the NRZI for data transmission and other operations (column 3, line 30-31 etc).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the NRZI format as taught by de Lind van Wijngaarde to the system of Choy et al and Lebby et al and Carbone et al and Steinman so that a high-rate, multi-purpose code format can be utilized.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Leman (US 2002/0072255) discloses removably connecting two cards.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LI LIU whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/L. L./
Examiner, Art Unit 2613
December 19, 2008

/Kenneth N Vanderpuye/
Supervisory Patent Examiner, Art Unit 2613